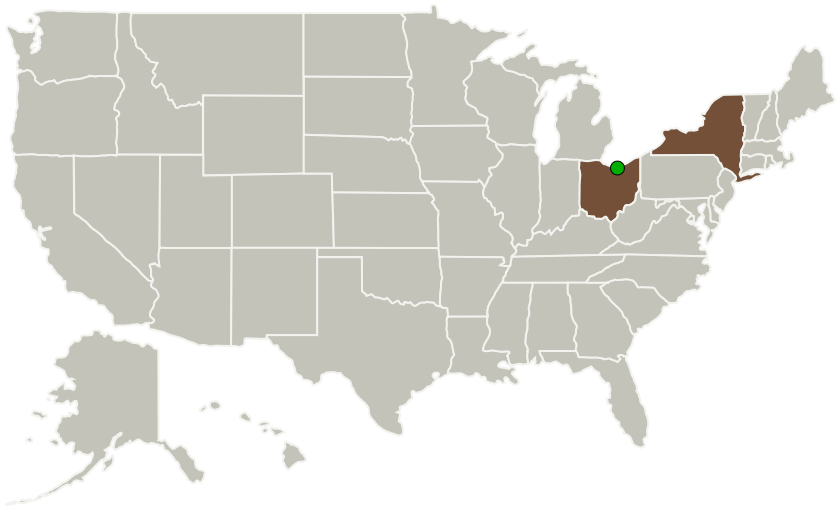
Lightweight, Efficient Power Converters for Advanced Turboelectric Aircraft Propulsion Systems, Phase I

Completed Technology Project (2010 - 2010)

Project Introduction

NASA is investigating advanced turboelectric aircraft propulsion systems that utilize superconducting motors to drive a number of distributed turbofans. In an early-stage concept, two superconducting turbine generators, mounted on each of the wing tips, are used to supply electrical power to 16 superconducting motors. Conventional electric motors are too large and heavy to be practical for this application, and so superconducting motors are required. These would operate at a temperature near that of liquid hydrogen, between 20 and 65 K. In order to improve maneuverability of the aircraft, variable speed power converters would be required to throttle power to the turbofans. The low operating temperature and the need for lightweight components that place a minimum of additional heat load on the refrigeration system opens the possibility of incorporating extremely efficient cryogenic power conversion technology. A complete study of cryogenic power conversion equipment for use in this application is the focus of this proposal. MTECH has designed, built, and tested a number of cryogenic inverters for different applications, and will adapt the cryogenic power technologies it has developed to the NASA application in this program.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
MTECH Laboratories, LLC	Lead Organization	Industry Small Disadvantaged Business (SDB)	Ballston Spa, New York
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
New York	Ohio

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139931)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

MTECH Laboratories, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Michael J Hennessy

Co-Investigator:

Michael Hennessy

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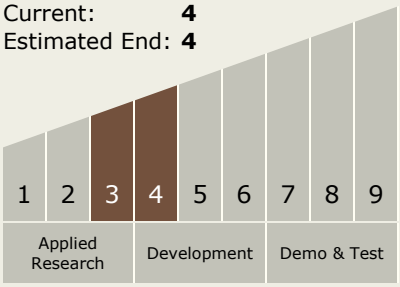
Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.3 Power Management and Distribution
    - TX03.3.3 Electrical Power Conversion and Regulation

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System